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Fiber technology: looking for the next generation

also in this issue:

- Annual rubber industry forecast
- Tire trends for the next decade
- NR vs. SR tire compounding outlook
- Carbon black rheology

Rubber World

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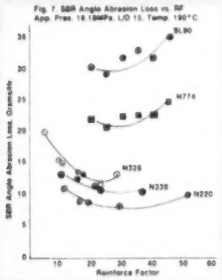

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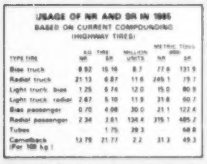

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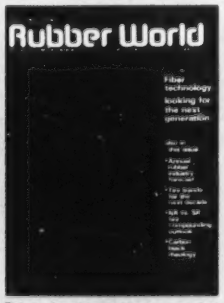

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A laser instrument at the Fibers Technical Center in Charlotte, N.C., measures the luster of individual polyester fibers of different cross sections for use in monitoring the quality of commercial products and developing new fiber types with improved properties.

ABP

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Industry forecast 1981: better, but by how much?

by David L. Schultz, Editor

"Economics" has been called the "inexact science." If this is true, then economic forecasting is an even *more* inexact science. The analysis of rubber-industry projections presented here is based on a number of sources: The World Bank, the Economic Intelligence Unit, Ltd. (EIU), the International Institute of Synthetic Rubber Producers (IISRP), the Rubber Manufacturers Association (RMA), and the U.S. Department of Commerce. While statistical data differ, most notably with the EIU, the concensus of projections call for modest growth through 1985 and a long-hoped-for recovery from a disastrous 1980. It ought to be noted, however, that these projections are all based on a general economic turnaround that may not materialize in the short-term future.

As William B. Franklin, *Business Week* editor, notes, "the disparity between the economic statistics and economic reality is getting wider, with the relatively favorable business statistics lagging behind the steady deterioration in underlying economic conditions." For example, much of the recent economic data seem to indicate that a solid business advance is under way, with more to come. But the data are not really in step with current conditions; the recovery is not as vigorous as it might seem, and it may become even less so in the months ahead. The gains appearing in many of the business statistics do not reflect the healthy glow of economic growth but the flush of inflation fever. With this *caveat* in mind, apparent statistical disparities will be self-explanatory.

The next 10 years

During the next ten years the pattern of growth of world demand for rubber will continue to be shaped by the automotive industry. But the tire business has been buffeted simultaneously by a number of factors including rapid cost increases for petrochemicals, sluggish growth resulting from increased tire life and minimal long-term prospects in domestic auto output, substantial imports of tires and finally, a cyclical downturn in the overall economy. As a result, for most major tire manufacturers, earnings per share declined during the period from July 1979 to June 1980.

During the past five years, more than 20 tire plants have closed, leaving an estimated 48 plants currently in operation. Most of these closures were of old plants that produced bias-ply tires, which have been a declining market sector. Passenger car, truck and bus tires account for 85% of the total value of tire industry shipments. The remainder includes several smaller special markets such as bicycle, motorcycle, farm tractor and implement tires, aircraft and industrial tires. Because of the state of the farm economy in 1980, farm tire shipments declined 22%; industrial tires were off 15%; and aircraft tire shipments remained unchanged.

In the area of non-tire rubber demand, growth in virtually all consuming areas is expected. Thus, overall world demand for rubber is projected to grow an average of 5.5% per year through 1990 — approximately 1% below the historical rate. Future growth in elastomer demand is anticipated to decrease more in developed and developing countries. In developed countries, rubber demand is forecast to grow 4.4% per year, compared to an annual historical rate of approximately 6%.

World output of natural rubber is expected to grow

World Elastomer Balance of Supply and Demand
Actual Averages, Projected, and Growth Rates, 1955 to 1990, Selected Years

Item	Actual averages (thousands of metric tons) 1955-57	1966-68	1972-74	1975-77	Projected (thousands of metric tons) 1985	1990	Growth rates (annual percentage) 1976-85	1985-90	1976-90
Production of elastomers									
Synthetic rubber	1,650	4,496	7,366	7,737	13,355	17,365	6.3	5.4	5.9
Natural rubber	1,935	2,533	3,357	3,493	5,245	6,135	4.6	3.2	4.1
Total	3,585	7,029	10,723	11,230	18,600	23,500	5.8	4.8	5.4
Consumption of elastomers									
Synthetic rubber	1,616	4,425	7,251	7,792	13,355	17,365	6.2	5.4	5.9
Natural rubber	1,902	2,619	3,384	3,536	5,245	6,135	4.5	3.2	4.0
Total	3,518	7,044	10,635	11,328	18,600	23,500	5.7	4.8	5.4
Consumption of natural rubber									
Developed countries	1,498	1,669	2,113	2,128	3,240	3,795	4.8	3.2	4.2
Developing countries	184	345	564	703	1,050	1,300	4.6	4.4	4.5
Centrally planned economies	220	611	707	705	950	1,040	3.4	1.8	2.8
Total	1,902	2,625	3,384	3,536	5,240	6,135	4.5	3.2	4.0
				(percent)					
Natural rubber market share									
World	54.1	37.2	31.8	31.2	28.2	26.1	—	—	—
World, excluding centrally planned economies	59.1	36.4	32.4	33.6	32.2	30.8	—	—	—

— Not applicable
Source: Actual data, International Rubber Study Group.

World Elastomer Demand
Actual Averages, Projected, and Growth Rates, 1955 to 1990, Selected Years

Economic region	Actual averages (thousands of metric tons) 1955-57	1972-74	1976-77	Projected (thousands of metric tons) 1985	1990	Growth rates (annual percentage) 1959-73	1976-85	1985-90	1976-90
Developed countries* — I	2,840	7,171	7,084	9,500	13,000	6.0	4.9	3.6	4.4
— II				9,500	12,500				
Developing countries	207	1,147	1,339	2,600	4,000	10.6	6.8	7.4	8.1
Centrally planned economies	673	2,567	2,883	5,300	7,000	7.7	7.0	5.7	6.5
World total — I	3,520	10,885	11,327	17,000	24,000	6.7	5.9	4.8	5.5
— II				16,600	23,500		5.7	4.8	5.4

*Alternative I refers to projections based on income elasticity; alternative II refers to projections d[illegible] m end uses.
Source: Actual data, International Rubber Study Group

Total New Rubber Consumption Forecast for U.S.A. and Canada (Thousand Metric Tons)

TYPE	1980 Estimate	1981	1985	1990
SBR-Solid	1,035	1,132	1,292	1,397
SBR-Latex	133	143	159	169
Polybutadiene	380	410	468	510
Polyisoprene	69	76	97	127
Ethylene-Propylene	131	145	184	223
Polychloroprene	113	122	137	150
Butyl	139	148	165	178
Nitrile-Solid	62	65	77	87
Nitrile-Latex	6	7	9	10
Other Synthetic	58	60	77	94
Total Synthetic	2,127	2,308	2,665	2,946
Natural Rubber	710	768	874	957
Total New Rubber	2,837	3,076	3,539	3,903
Synthetic Percent	75.0	75.0	75.3	75.5

Rubber Consumption — U.S.A. and Canada (Thousand Metric Tons)

	Estimate 1980	1981	1985	1990
U.S.A.				
Natural	624	677	772	846
Synthetic	1,946	2,119	2,449	2,706
Total	2,570	2,796	3,221	3,552
Canada				
Natural	86	91	102	111
Synthetic	181	189	216	245
Total	267	280	318	351
Grand Total	2,837	3,076	3,539	3,903

approximately 4% per year through 1990, which is slightly over 1% per year above the historical rate. However, the market share of natural rubber is likely to continue to decline during the next fifteen years as a result of inadequate supply. The world market share of natural rubber is projected to fall from 30% in 1977, to 28% in 1985, and to 26% in 1990.

From 1948 to 1973, total world consumption of rubber increased steadily at an average rate of 6.3% per year. This growth followed closely the growth of world industrial production, particularly in industrialized countries. The recovery of industrial production in general after the end of World War II created a strong demand for elastomers and propelled the world rubber economy into a period of rapid and sustained growth.

The latest statistics on rubber consumption, however, indicate a sharp downturn in demand as opposed to a variety of previous projections. The International Institute of Synthetic Rubber Producers (IISRP) recently released its long-term forecasts of rubber consumption during the 1980's. This report shows a 1.4% average annual growth rate for synthetic rubber from 1979 to 1990. Total rubber (synthetic plus natural) consumption matches this growth rate giving synthetic rubber 75.5% of total consumption. According to the IISRP report, during the next decade the percentage of total rubber going into tires and tire products will decrease from 63.1% to 61.8%. The recession and large numbers of imported automobiles, the report says, may cause rubber consumption in 1980 to decline 16% from 1979. Longer-wearing radial tires, along with smaller tires for smaller cars, contribute to the projected modest growth rate.

According to the Economist Intelligence Unit, Ltd., the latest indicators show a sharp downturn in overall rubber consumption in most Western countries during the second half of 1980, and no quick recovery is anticipated. Considering the current situation, there is no doubt that the price of synthetic rubber will continue to be under pressure and manufacturers will be forced to cut prices even further in order to keep plant capacity utilization at a reasonable level.

As a result of the deepening recession in the auto industry, the price of natural rubber has fallen sharply, averaging over 30%, even though it has recently recovered some lost ground. The price may move up marginally, but any major increase will have to wait until the overall economic situation improves, especially in the auto industry. Demand for natural and synthetic rubber has been declining significantly in a number of key markets since the beginning of 1980. In the U.S., first-quarter 1980 demand amounted to only 714,000 tons. This represented a drop of 17% compared to the same period in 1979.

Domestically, the output of synthetics was reduced considerably, dropping by an average of 10%, according to the EIU. However, the decline in output was not as great as the decline in demand and, as a result, stocks of synthetics have grown during the period. In the West European countries, the level of output continued to increase, particularly in West Germany and France. In the UK, however, the trend was easing off by last April.

Some manufacturers of synthetics in Western Europe have misjudged the market by producing more synthetic rubber than existing markets. As a result, considerable price competition developed and selling prices have been reduced in order to balance surplus stock.

The forecasts prepared by the EIU indicate that the situation for world rubber consumption has deteriorated, and thus projections for the short-term outlook have been downgraded. For the first half of 1980, estimated consumption dropped marginally — only 1%. But the second half saw a decline of 4%. In addition, the increase in stocks for both natural and synthetic rubber are higher than originally anticipated. While major producers of synthetics have reduced their throughput, the fall in production is limited to approximately 2% for 1980. Considering the situation, synthetic rubber prices will continue under pressure; and it is unlikely that any price increase will be successful in the short term. The continued overcapacity in the industry will hamper any such attempt while increasing competition from various sources means that rubber prices will remain steady and, in some cases, be reduced.

RMA report

The Rubber Manufacturers Association (RMA), however, sees a gradual improvement in its economic outlook for the tire and rubber industry. Sales of tires, industrial rubber products, molded and extruded goods were all below 1979 levels. But according to the RMA an upturn in these markets is expected in 1981 based on a general economic recovery, particularly in the automotive sector.

Tire shipments in 1980 have been running considerably below 1979 levels, the RMA forecasts an upward turn in 1981 and 1982. Total shipments of passenger tires — original equipment and replacement — are expected to be 151 million in 1980, rising to 167 million in 1981 and to 180 million in 1982. Total shipments of truck and bus tires are expected to be 31.8 million in 1980, rising to 35.9 million in 1981 and then 39.5 million in 1982.

Forecast of Natural Rubber Consumption by Region in 1980
('000 tons)

	1979	1980
North America	840	820
Western Europe, Africa & Middle East	1,005	1,026
Asia (including Australasia)	991	1,041
Latin America	193	207
Communist countries	725	728
Total	3,754	3,822

The market for industrial products including hose, conveyor belts and V-belts has also been soft. But it is expected to bounce back in 1981 with continued growth at least through 1985. The RMA reports that demand for all three product areas in 1980 dropped approximately 6% overall from 1979 to $1.55 billion. In 1981, the total demand for all three products is expected to rise about 4.8% to $1.63 billion. Through 1985, U.S. demand for industrial products is expected to rise steadily each year to a total of $1.88 billion.

As for the market outlook for molded, extruded and lathe-cut mechanical rubber products, the RMA sees an improving situation. It is estimated that total production of mechanical rubber goods in 1980 will be $1.705 billion. Forecasts call for a 1981 production increase to $1.078 billion. All of these predictions are based on the assumption that the worst of the general economic recession is over and that the automobile industry, in particular, is headed for better days.

Synthetic Rubber: Trends and Projections 1975-81
(in millions of current dollars except as noted)

Item	1975	1976	1977	1978	1979[a]	1980[b]	Percent change 1979-80[c]	1981[c]	Percent change 1980-81[c]
Industry (SIC 28220)									
Value of shipments[d]	1,456	1,702	1,863	1,971	2,225	2,100	—5.6	2,500	19.0
Value added	489	511	569	574	675	830	—8.7	750	19.0
Value added per production worker-hour ($)	34.49	34.28	40.15	39.61	..	..	..	..	..
Total employment (000)	9.9	10.6	10.5	10.1	10.1	10.0	—1.0	..	..
Production workers (000)	7.0	7.6	7.2	7.3	7.3	7.0	—4.1	..	..
Average hourly earnings (Dec.—$)	5.70	6.24	6.75	7.78	7.92	[e]8.20	[e]9.6	..	..
Year-to-year percent change in average hourly earnings (Dec.-Dec.)	9.6	9.5	8.3	15.1	7.2	..	..	..	..
Year-to-year percent change in industry price index (Dec.-Dec.)[e]	1.3	3.3	9.8	7.3	17.6	[e]20.8	..	..	..
Capital expenditures	35	40	53	30	..	..	..	..	..
Product (SIC 28220)									
Value of shipments[f]	1,820	2,204	2,343	2,839	3,175	2,975	—6.3	3,560	20.3
Quantity shipped (unit of measure)[g]	4,500	5,450	5,850	5,850	5,900	4,800	—18.6	5,425	13.0
Year-to-year percent change in producers price index (Dec.-Dec.)[e]	—2.0	7.9	6.6	8.9	18.6	[e]20.3	..	..	..
Trade									
Value of exports	267	334	325	369	601	750	24.8	..	..
Value of imports	73	97	139	158	177	177	0.0	..	..

[a] Value of all products and services sold by the hose and belting industry (SIC 2822)
[b] Estimated except for hourly earnings, price indexes, and 1979 trade data.
[c] Forecast.
[d] As of July 1980.
[e] July 1979 to July 1980. Note: Months may differ for the price and earnings indexes.
[f] December 1967 is the base period for index.
[g] Value of shipments of hose and belting produced by all industries.

Source: Bureau of the Census (industry and trade data), Bureau of Labor Statistics (hourly earnings and price indexes). Estimates and forecasts by the Bureau of Industrial Economics.

Tires and Inner Tubes: Trends and Projections 1975-81
(In millions of current dollars except as noted)

Item	1975	1976	1977	1978	1979[2]	1980[3]	Percent change 1979-80[4]	1981[3]	Percent change 1980-81[3]
Industry (SIC 3011)									
Value of shipments[1]	7,143	7,714	9,540	8,887	9,875	9,350	—5.3	11,000	17.6
Value added	3,463	3,534	4,638	4,107	4,545	4,400	—3.2	5,175	17.6
Value added per production worker-hour ($)	22.68	25.98	25.65	30.40	33.07	--	--	--	--
Total employment (000)	106	104	114	103	101	84	—16.8	88	4.8
Production workers (000)	80	79	88	81	79	62	—15.2	66	6.4
Average hourly earnings (Dec.—$)	5.70	7.15	2.33	7.82	9.04	[5]9.50	[5]12.3	--	--
Year-to-year percent change in average hourly earnings (Dec.-Dec.)	4.4	25.4	2.5	6.7	15.6	[5]--	[5]--	--	--
Year-to-year percent change in industry price index (Dec.-Dec.)[6]	5.8	13.4	—0.1	9.4	9.0	[5]15.0	[5]--	--	--
Capital expenditures	272	244	286	356	--	--	--	--	--
Product (SIC 3011)									
Value of shipments[7]	6,107	6,528	8,136	8,300	9,175	8,700	—5.2	10,235	17.6
Year-to-year percent change in producers price index (Dec.-Dec.)[8]	5.8	13.6	—1.4	5.5	24.3	[5]15.4	[5]--	--	--
Product classes									
Value of shipments[7]									
Passenger cars	3,392	3,631	4,540	4,496	5,000	4,950	—1.0	5,600	13.1
Truck and bus	1,709	1,754	2,308	2,529	2,800	2,460	—12.5	3,100	26.5
Quantity shipped (millions of tires)									
Passenger cars	167	177	195	200	184	165	—10.3	175	6.1
Truck and bus	27	31	37	44	41	32	—22.0	38	18.8
Trade									
Value of exports	306	219	309	280	353	525	48.7	--	--
Value of imports	566	889	982	1,056	1,373	1,425	3.8	--	--

[1]Value of all products and services sold by the hose and belting industry (SIC 3011).
[2]Estimated except for hourly earnings, price indexes, and 1979 trade data.
[3]Forecast.
[4]As of July 1980.
[5]July 1979 to July 1980. Note: Months may differ for the price and earnings indexes.
[6]December 1979 is the base period for index.
[7]Value of shipments of hose and belting produced by all industries.
Source: Bureau of the Census (industry and trade data), Bureau of Labor Statistics (hourly earnings and price indexes). Estimates and forecasts by the Bureau of Industrial Economics.

Hose and Belting: Trends and Projections 1975-81
(In millions of dollars except as noted)

Item	1975	1976	1977	1978	1979[2]	1980[3]	Percent change 1979-80[4]	1981[3]	Percent change 1980-81[3]
Industry (SIC 3041)									
Value of shipments[1]	1,235	1,412	1,767	1,900	1,950	1,825	—6.4	2,125	16.4
Value added	695	804	974	1,050	1,075	1,000	—7.0	1,175	17.5
Value added per production worker-hour ($)	18.94	21.11	24.11	26.40	26.13	--	--	--	--
Total employment (000)	27	30	31	32	32	27	—15.6	31	14.8
Production workers (000)	19	21	21	22	22	18	—18.2	21	16.7
Average hourly earnings (Dec.—$)	N.A.	N.A.	N.A.	6.06	6.44	[5]6.90	[5]13.1	--	--
Year-to-year percent change in average hourly earnings (Dec.-Dec.)	N.A.	N.A.	N.A.	N.A.	13.8	[5]--	[5]--	--	--
Capital expenditures	80	54	53	--	--	--	--	--	--
Product (SIC 3041)									
Value of shipments[7]	1,216	1,367	1,561	1,868	1,725	1,615	—6.4	1,870	15.8
Product classes									
Value of shipments[7]									
Flat belts	269	248	276	273	325	315	—3.1	360	14.3
V-belts	238	296	348	397	400	380	—5.0	460	21.1
Hose	703	800	922	980	975	900	—7.7	1,025	13.9
Year-to-year percent change in producers price index (Dec.-Dec.) belts and belting[8]	N.A.	N.A.	N.A.	N.A.	N.A.	[5]19.6	[5]--	--	--
Trade									
Value of exports	71	68	86	151	173	155	—10.4	--	--
Value of imports	61	67	78	111	137	137	0.0	--	--

[1]Value of all products and services sold by the hose and belting industry (SIC 3041).
[2]Estimated except for hourly earnings, price indexes, and 1979 trade data.
[3]Forecast.
[4]As of July 1980.
[5]July 1979 to July 1980. Note: Months may differ for the price and earnings indexes.
[6]December 1979 is the base period for index.
[7]Value of shipments of hose and belting produced by all industries.
Source: Bureau of the Census (industry and trade data), Bureau of Labor Statistics (hourly earnings and price indexes). Estimates and forecasts by the Bureau of Industrial Economics.

Forecast of Synthetic Rubber Consumption by Region In 1980
('000 tons)

	1979	1980
North America	2,545	2,485
Western Europe, Africa & Middle East	1,776	1,814
Asia (including Australasia)	1,256	1,319
Latin America	485	525
Communist countries	2,716	2,877
Total	8,778	9,020

Forecast of Rubber Consumption In the Western World by Product Group In 1980
('000 tons)

	1979	1980
Polychloroprene	292	296
Butyl	402	412
Nitrile	200	198
Other synthetics	118	121
Total synthetics	6,062	6,144
Total natural	3,028	3,093
Total rubber	9,090	9,237

Source: International Institute of Synthetic Rubber Producers.

Commerce outlook: 2%

According to the U.S. Department of Commerce, the current dollar value of shipments by the rubber and plastics products industries (SIC 30) is expected to increase from $49 billion in 1980 to almost $60 billion in 1981 to constitute a rise of 17.5%. Real growth in these industries, however, is pegged at approximately 6%, reflecting long-term growth of 4%. Shipments by the rubber and rubber products industries are expected to increase 16.5% between 1980 and 1981, from $19 billion and $22 billion. Commerce views real long-term growth for rubber products as sluggish, less than 2% annually.

In sharp contrast to the EIU forecast cited above, commerce predicts that the value of shipments by the synthetic rubber industry will be about $2.5 billion in 1981, up 19% from 1980. This growth in value will represent a real growth of 13% plus price increases of 6%. The real annual growth rate to 1985 will be 1% to 2%, primarily in specialty elastomers. Specialty rubbers usually are higher priced than general-purpose rubbers, have unique characteristics, and are used in a wide variety of products. Most recent industry growth has been in selected specialty rubbers, and Commerce expects this to be the case in the future. Among the specialties, for example, thermoplastic elastomers have become a major item in the industry. Though no separate statistical data are reported for thermoplastic rubbers, Commerce notes that "production probably exceeded 100,000 tons in 1980 and could rise to 250,000 tons by 1985." Other specialties with significant growth rates include silicone rubbers and epichlorohydrin elastomers.

In the tire and inner tube sector, Commerce says that the value of shipments will be about $11 billion current dollars in 1981, up almost 18% from $9.4 billion in 1980.

The report cautions that "the raw statistics are highly misleading because in 1981 the industry will be recovering from extremely low output in 1980 and will be experiencing continued price increases." Physical output in 1981 should be up more than 8% from 1980 but will be substantially below previous record years. Through 1985, real long-term growth will be very slow, averaging less than 2% annually, although a cyclical surge should make 1982 and 1983 reasonably good years.

The value of hose and belting industry shipments, according to Commerce, will increase over 16% in 1981, to $2.1 billion (current dollars). Shipments declined in 1980, as expected, but the severity of the downturn, over 6%, was greater than generally anticipated. During 1981, growth should accelerate throughout the year, and final-quarter shipments are expected to be substantially above the first quarter. Commerce notes that "growth in the value of shipments in 1981 will represent price increases of almost 10%, long-term real growth of 4%, and partial cyclical recovery. Real growth should continue at a 4% annual rate to 1985."

Hose and belting have been the fastest growing segment of the generally slow-growing rubber products industries. Important markets for hose and belting are for automotive, agricultural, mining, industrial, and construction applications. Mining, particularly coal mining, is a significant market for these products and also is a potentially rapid-growth market for the future. Developing the vast coal reserves in the U.S. will require substantial additional quantities of hose and belting, especially flat belting; and this prospect is a source of long-term optimism for the industry. Other markets depend on overall economic activity, especially in transportation equipment and in construction of new plants; in short, capital investment. **RW**

US Ethylene Supply/Demand 1968/1990 (Forecast)